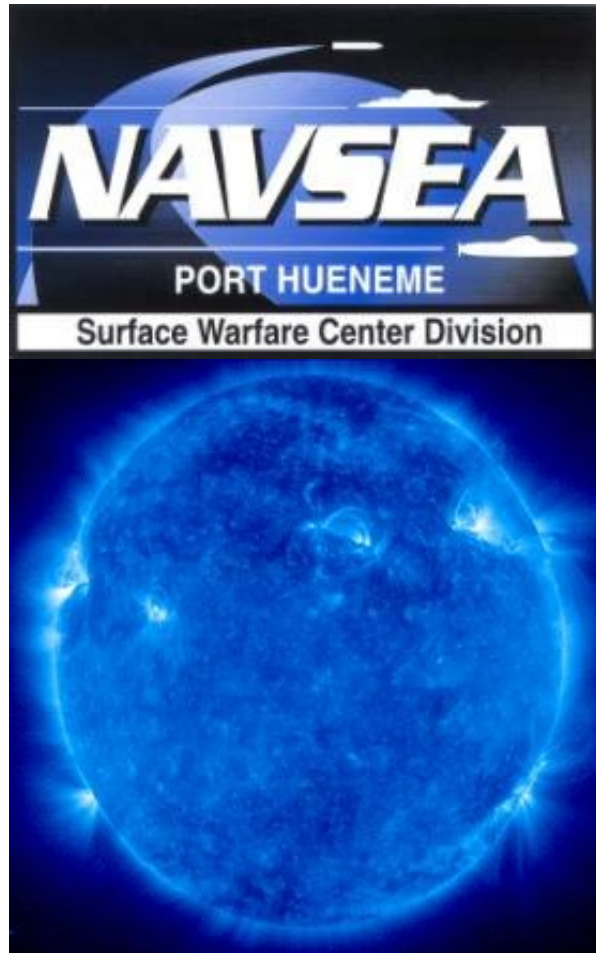


# ***NSWC PHD***

## ***White Sands Detachment***

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### **Industry Day**

### **Theoretical Studies and**

### **Engineering Research**

**7 Mar, 2006**

**By**

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# Overview

## Programmatic & Technical



# Programmatic



# Need

- **To develop and meet the USER community needs for surface launched vehicles**
- **These vehicles serve a wide range of technologies in weapon system and sensor development**
  - These vehicles help exercise and stimulate BMC4I systems, Radar and Infrared Sensors, TSPI instrumentation, and Space Experiments
- **The USER Community involves both Commercial and Department of Defense**
  - At times extends in supporting our Allies over seas



# Services & Products

- **NAVSEA seeks partners in industry that will supply engineering, hardware and software for a family of surface launched vehicles and facilities**
- **Engineering Services --- vehicle design and analysis**
- **Hardware**
  - Rocket motors modifications and production
  - Payload design and fabrication
- **Instrumentation --- payload design and fabrication to be flown on surface launched vehicles**
- **Provide vehicle build-up and launch operations**
- **Access to proper facilities for ordnance build, electronic labs, environmental qualifications, payload build-up, launch block house, ground support equipment and launchers**

# Operation Locations

- **NAVSEA supports launch operations in following locations**
  - White Sands Missile Range, New Mexico
  - Pacific Missile Range, Kauai – Hawaii
  - San Nicolas Island --- of the California Coast
  - Wallops Flight Test Facility, Virginia
  - Australia





# Mission Load

- **Our mission load varies from year to year as well as the vehicle complexity**
- **Operations can vary from 5 to 20 launches per year and at various locations**
- **The vehicles can be a single stage, two-stage or three-stage configuration**
- **Instrumentation ranges from none to with high level of sophistication**

**Bottom Line We Tailor the Vehicle to Meet the desired presentation for the “USER”**



# **Government Furnished Equipment (GFE)**

- **Industry partners would need to identify the need for GFE**
  - **To include hardware, motors, etc ....**
  - **To include ordnance and vehicle assembly facilities**
  - **To include workshops and labs**
  - **To include instrumentation**
  - **To include handling gear**





# **Cost, Schedule & Performance**

- **The RFP will contain case studies associated with surface launch vehicle**
- **Industry response must be able to articulate the technical approach in the generation of a flight vehicle**
  - **Engineering and analysis, facilities, equipment, manning, etc...**
- **Execution Schedule will need to be provided**
- **Cost for --- Hardware and Labor Rates**
  - **Along with the burdened rates and the area that they are applied**

# Security

- **Industry must be able to support at a minimum US Secret operations**
  - **Personnel must be able to have and maintain a US secret clearance**
  - **Access to facilities to manage, discuss and store classified information**
  - **Access to equipment to operate and store classified material**
    - Such as safe's, computers, etc...
- **Higher type of clearance may be required though rare and will be managed on a case by case basis**



# Surface Launch Vehicles

- **List exiting motor experience and configuration**
  - M-112, MK-12, MK-70, MK-104, Black Brant, Oriole, Star series, Castor Series, Talos, Nike, etc....
- **NAVSEA standard configurations**
  - Single Stage, Two-Stage, and Three Stage motor stack



# Rocket Motor Hardware

- **Refurbishment and rebuilt**
  - Certified for flight
  - Shelf Life Expired
- **Industry propulsion assets**
  - 10" to 30" diameter
- **Interface adaptors**
  - Load bearing tail cans / inter stages
  - Fins
- **Launcher Interfaces**
- **Suitable Ordnance Systems**
  - Initiators, separations, spin-up, de-spin, etc...

# Launcher Systems

- **Industry partners need to identify launcher system experience with:**
  - **Minimum with: MRL, Athena, 50K and Stool**
  - **List any other type of launcher systems experience and the class of vehicle flown on those launchers**
- **List the ability to manufacture and/or maintain such systems**
  - **Such as servicing equipment, firing lines, rails, trolleys, azimuth and elevation drives, etc...**
  - **Rail / Vehicle interface**
- **List launcher access and/or locations supported**





# Ground Support Equipment

- **Handling Gear**
  - **Ordnance approved, motor & payload carts, ground equipment**
- **Control Point Equipment**
  - **Suitcase equipment, ordnance control, power systems & vehicle sub-systems**
- **Ground Station**
  - **Telemetry, Command Up-link Transmitters, etc...**
  - **With display functionality**

# Facilities

- **Industry will need to provide a list of facilities, locations and qualifications to support operations it owns and/or have access**
  - **Launch Equipment**
  - **Vehicle Assemble Buildings**
  - **Ordnance Buildings**
  - **Environmental qualifications --- i.e. spin, vibration, bending, etc...**

# Hardware / Payload Systems

- **Attitude Control Systems**
  - Use these systems to re-orient the vehicle in flight: both in flight trajectory and vehicle aspect
  - Potential dispersion reduction
  - Magnetic based, position based, or stellar based
- **Boost Guidance Systems**
  - Dispersion reduction, trajectory shaping
- **Recovery Systems**
  - Nose tip and aft recovery systems to re-use and or salvage expensive payload hardware
  - Proven system reliability for payloads weighing between 100lbs to 1000lbs
- **Ordnance Decks**
  - Used to control timed events while vehicle is in flight

# Instrumentation

- **Time, Space, Position**
  - C-band Beacon and/or GPS
- **Attitude**
  - Reference system --- IMU or other
- **Up-link receivers**
  - Flight Termination Systems
  - Command Uplink for task execution
- **Timing System**
  - To control ordnance and/or payload events --- such as separations or on board data recording
- **L and S band Telemetry down links**
  - Bit rate range from 100KBit to 10 Mbit
  - Up to 4 independent streams
  - At time the stream will need to be encrypted for security reasons

# Engineering & Analysis

- **Basic vehicle engineering**
  - To include structural, aerodynamic, heating, flight loads, launcher interaction, etc...
- **Performance**
  - Validated models
  - Acceleration & velocity profile, altitude and range vs time, roll history, etc...
  - Multiple degree of freedom simulations
  - Dispersion analysis
  - Ground and flight safety data packages
- **Characterized Behavior**
  - Mean variation, environmental characteristics (acoustic, vibration, thermal)

# Data

- **Telemetry Graphical User Interface (GUI)**
  - Depend on the instrumentation team to be able to generate telemetry data based and GUI displays used for flight test evaluation
  - Could be computer screens and/or strip charts
- **Vehicle Performance Verification**
  - Predicted vs Actual
  - Vehicle data base update
  - External Influences --- i.e. meteorology
- **Field Operation Availability**
- **Security --- at time data will require special handling due to classification**
- **Must be able to generate post event reports**
  - 2hr quick look
  - 24hr quick look
  - 30day initial report
  - 90day final report



# Manning

- **Availability of disciplines and experience**
  - **Analysis**
  - **Engineering --- multiple disciplines**
  - **Technician**
    - Ordnance, Electrical, Mechanical, etc...
  - **Certification**
- **Instrumentation**
  - **Development and field support**
- **Logistics, Administrative, Fiscal**



# **Design Review & Documentation**

- **Design Reviews**
  - PDR, CDR, MRR, TRR, etc...
- **Verification testing and process**
- **Procedure Control**
  - Hazardous and Non-Hazardous
- **Interface Control Documents**
- **Configuration Management**
- **Inventory Control**
- **Reports**
  - Analysis
  - Engineering Designs --- i.e. mechanical, electrical, etc...

# Questions